WHAT IS CLAIMED IS:

1. Display apparatus comprising:

electron emission elements aligned in a matrix on a substrate and driven by column lines and row lines;

a column line drive unit for driving the column lines in a pulse width modulation manner by applying to each column line one of pulses which have different pulse widths respectively corresponding to gradation levels of a luminance signal to be displayed in the display apparatus;

a row line drive unit for sequentially driving the row lines;

first means for defining a plurality of blocks each of which includes at least one column line by dividing the column lines and a plurality of gradation steps each of which includes at least one gradation level by dividing the gradation levels, and detecting a block driving status which indicates how the gradation levels in each of the gradation steps are applied to the columns in each block; and

second means for defining a plurality of periods within one horizontal interval, the periods being associated with widths of approximating pulses corresponding respectively to the gradation steps, calculating a voltage drop due to a resistance in the row line and the current flow by the

approximating pulses on the column lines during each of the defined periods on the basis of the detected block driving status, determining a block voltage drop for each block estimated from the voltage drops over the plurality of periods, and modifying the luminance signal for each block according to the determined block voltage drop.

2. The display apparatus according to Claim 1, wherein said first means detects the block driving status for each block by setting subintervals in one horizontal interval each of which corresponds to each block and compares the luminance signal with the gradation steps during each of the subintervals.

3. The display apparatus according to Claim 2, wherein said first means detects the block driving status which indicates how many column lines in the block have the gradation levels in each of the gradation steps.

4. The display apparatus according to Claim 1, wherein said column drive unit adds a correction data according to the determined block voltage drops to the luminance signal in driving each column line with the luminance signal the change the pulse width.

5. The display apparatus according to Claim 1, wherein said column drive unit produces output voltages varied according to the determined block voltage drops.

6. The display apparatus according to Claim 5, said column line drive unit includes output circuits provided for the respective column lines and each output circuit selects either one of a plurality of voltage supply units having different output potentials, and a peak value of a pulse applied to each column line is determined by a potential of the selected voltage supply unit.

7. The display apparatus according to Claim 1, wherein said second means modifies the luminance signal for each block by getting a correction data for each column in the block through a linear interpolation and applying the correction data to the column line.

8. The display apparatus according to one of Claims 1 to 7, wherein said row line drive unit comprises two subunits provided on both sides of the row lines and said subunits apply an equal voltage at the same timing to each row line.

9. The display apparatus according to one of Claims 1 to 8, wherein said electron emission element is a type of cold cathode.

10. The display apparatus according to Claim 9, wherein said electron emission element is a type of surface conduction electron emission.

11. A method of driving display apparatus comprising electron emission elements aligned in a matrix on a substrate and driven by column lines and row lines, a column line drive unit for driving the column lines in a pulse width modulation manner by applying to each column line one of pulses which have different pulse widths respectively corresponding to gradation levels of a luminance signal to be displayed in the display apparatus and a row line drive unit for sequentially driving the row lines, comprising the steps of:

calculating a voltage drop due to a resistance in the row line and the current flow by the pulse widths on the column lines, and

modifying the luminance signal according to the calculated voltage drop so that for the same luminance data, a width of a pulse applied to a column line is longer as the column line is aligned more distant from the row line drive unit.

EP 1 291 841 A2

12. A method for driving display apparatus comprising electron emission elements aligned in a matrix on a substrate and driven by column lines and row lines; a column line drive unit for driving the column lines in a pulse width modulation manner by applying to each column line one of pulses which have different pulse widths respectively corresponding to gradation levels of a luminance signal to be displayed in the display apparatus, and a row line drive unit for sequentially driving the row lines, comprising the steps of:

defining a plurality of blocks each of which includes at least one column line by dividing the column lines and a plurality of gradation steps each of which includes at least one gradation level by dividing the gradation levels;

detecting a block driving status which indicates how the gradation levels in each of the gradation steps are applied to the columns in each block;

defining a plurality of periods within one horizontal interval, the periods being associated with widths of approximating pulses corresponding respectively to the gradation steps;

calculating a voltage drop due to a resistance in the row line and the current flow by the approximating pulses on the column lines during each

JP01-800560

of the defined periods on the basis of the detected block driving status, determining a block voltage drop for each block estimated from the voltage drops over the plurality of periods; and

modifying the luminance signal for each block according to the determined block voltage drop.

13. The method according to Claim 12, wherein said detecting step detects the block driving status for each block by setting subintervals in one horizontal interval each of which corresponds to each block and compares the luminance signal with the gradation steps during each of the subintervals.

14. The method according to Claim 13, wherein said detecting step detects the block driving status which indicates how many column lines in the block have the gradation levels in each of the gradation steps.

15. The method according to Claim 1, wherein the luminance signal for each block is modified by getting a correction data for each column in the block through a linear interpolation and the correction data is applied to the column line.